

In response to Item 1 above, Applicant has now amended claims 1-20 so as to more distinctly claim the subject matter of the present invention. Specifically, Applicant has now amended the claims to delete wording objected to by the Examiner and to specify that the subject of claims 1-18 is a waveguide device. As amended, it is believed that the objections to claims 1-20 have been rendered moot, and claims 1-20 are now in condition for allowance.

In response to Item 2 above, Applicant respectfully traverses the rejection under the judicially created doctrine of double patenting as the present application is a continuation application of prior U.S. Patent Application Serial No. 09/532,529, filed 03/21/00 by Parviz Tayebati for ELECTRO-OPTICALLY TUNABLE EXTERNAL CAVITY MIRROR FOR A NARROW LINEWIDTH SEMICONDUCTOR LASER, which is in turn a continuation application of U.S. Patent No. 6,041,071, application Serial No. 08/726,049, filed 09/27/96 by Parviz Tayebati for ELECTRO-OPTICALLY TUNABLE EXTERNAL CAVITY MIRROR FOR A NARROW LINEWIDTH SEMICONDUCTOR LASER. A Terminal Disclaimer is submitted herewith so as to obviate the double patenting rejection over U.S. Patent No. 6,041,071.

In view of the foregoing amendment and remarks, it is believed that the Examiner's bases for rejection of the claims of

this application have either been rendered moot or been overcome.

In view of the foregoing, claims 1-20 are believed to be in condition for allowance. Early and favorable reconsideration is therefore respectfully requested.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A tunable external cavity waveguide device [adapted for tuning a semiconductor laser], said [tunable external cavity] waveguide device comprising:

a ferroelectric electro-optical substrate;

[means for creating] a waveguide formed in said substrate by a strain field induced therein; [and]

a distributed Bragg reflector (DBR) [for selecting a laser oscillation wavelength] disposed adjacent a portion of said waveguide; and

means for applying a voltage difference across said distributed Bragg reflector.

2. (Amended) A tunable external cavity waveguide device according to claim 1 wherein said substrate has an electro-optic coefficient of no less than $r_{33} = 240$ pm/V and a strain-optic coefficient which is positive.

3. (Amended) A tunable external cavity waveguide device according to claim 2 wherein said substrate has a strain-optic coefficient in the range of about 0.1.

4. (Amended) A tunable external cavity waveguide device according to claim 3 wherein said substrate comprises SBN.

5. (Amended) A tunable external cavity waveguide device according to claim 4 wherein said substrate comprises SBN:61.

6. (Amended) A tunable external cavity waveguide device according to claim 4 wherein said substrate comprises SBN:75.

7. (Amended) A tunable external cavity waveguide device according to claim 3 wherein said substrate comprises PLZT.

8. (Amended) A tunable external cavity waveguide device according to claim 3 wherein said substrate comprises LiNbO₃.

9. (Amended) A tunable external cavity waveguide device according to claim 3 wherein said substrate comprises LiTaO₃.

10. (Amended) A tunable external cavity waveguide device according to claim 3 wherein said substrate comprises BaTiO₃.

11. (Amended) A tunable external cavity waveguide device according to claim 1 wherein said substrate has an index of

refraction, wherein said waveguide is [created] formed in said substrate by inducing a compressive strain field within said substrate, and wherein said compressive strain field [creates a] forms graduated variations in the index of refraction of said substrate.

12. (Amended) A tunable external cavity waveguide device according to claim 11 further comprising [wherein said compressive strain field is created by depositing] a layer of material deposited on said substrate, [wherein] said layer of material [deposited on said substrate has] having a different coefficient of thermal expansion than said substrate, and [further wherein] said compressive strain field induced by said layer of material [is] applied to said substrate at an elevated temperature and then allowed to cool to a reduced temperature.

13. (Amended) A tunable external waveguide device according to claim 12 wherein said substrate comprises a flat surface, and wherein said wavelength device further comprises said layer of material [is] deposited onto said flat surface, and [further wherein] a channel [is] formed in said layer of material [after cooling] at said reduced temperature.

14. (Amended) A tunable external cavity waveguide device according claim 12 wherein said substrate comprises a ridge projecting out of a flat surface, and wherein said waveguide device further [wherein] comprises said layer of material [is] deposited onto said flat surface adjacent said ridge.

15. (Amended) A tunable external cavity waveguide device according to claim 1 wherein said substrate comprises a ridge projecting out of a flat surface, and wherein said waveguide device further [wherein] comprises a layer of material [is] deposited onto said ridge, said layer of material having a larger index of refraction than said substrate[, whereby said waveguide will be created in said substrate].

16. (Amended) A tunable external cavity waveguide device according to claim 1 wherein said substrate comprises a flat surface, and said waveguide device further [wherein] comprises a layer of material [is] deposited onto said flat surface, said layer of material comprising a ferroelectric electro-optical material having a larger index of refraction than said substrate.

17. (Amended) A tunable external cavity waveguide device according to claim 1 wherein said waveguide device further comprises phase control means for selecting a cavity mode.

18. (Amended) A tunable external cavity waveguide device according to claim 17 wherein said phase control means comprise means for applying a voltage difference across a portion of said waveguide.

19. (Amended) An external cavity mirror [cooperatively] disposed relative to [with] a semiconductor laser for directing a portion of the emitted laser light back into an optically active region of said semiconductor laser, said external cavity mirror comprising a substrate comprising a ferroelectric electro-optical material, a waveguide formed in said substrate by a strain field induced therein, and an electro-optically tunable distributed Bragg reflector (DBR) [formed on said substrate] disposed adjacent a portion of said waveguide, wherein said portion of emitted laser light is directed back into said optically active region of said semiconductor laser as a function of a pre-determined external voltage difference [that is] selectively applied across said distributed Bragg reflector (DBR).

20. (Amended) A semiconductor laser comprising:

an active section of a diode [adapted to create a light beam by spontaneous emission] which emits light over a bandwidth around [some] a given center frequency [, wherein said active section guides said light between];

an external cavity mirror bounding one end of said active section; and

a partially reflective mirror bounding an opposite end of said active section [so as to create an emitted beam of laser light therefrom];

said external cavity mirror being [cooperatively] disposed [with] relative to said active section [semiconductor laser] for directing a selected portion of said light [beam] back into said active section, said external cavity mirror comprising a substrate comprising:

a ferroelectric electro-optical [material] substrate;

a waveguide formed in said substrate by strain field induced therein; [and]

a distributed Bragg reflector (DBR) formed on said substrate; and

means for applying a voltage difference across said external cavity mirror.

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